

AMENDMENTS TO THE CLAIMS

1.-118. (Canceled)

119. (Currently Amended) A method for enzymatically synthesizing a functionalized polymer comprising:

enzymatically coupling an antioxidant to each of a plurality of ~~monomers~~ molecules to form antioxidant-coupled monomers capable of forming an antioxidant-coupled functionalized polymer; and,

enzymatically polymerizing the antioxidant-coupled monomers to form ~~[[an]]~~ the antioxidant-coupled functionalized polymer;

whereby the resultant functionalized polymer has inherent antioxidant capabilities.

120. (Currently Amended) The method of claim 119, wherein the step of coupling an antioxidant to each of a plurality of ~~monomers~~ molecules is carried out such that the resultant polymer has at least 1% of its monomeric units functionalized with antioxidants.

121. (Currently Amended) The method of claim 119, wherein the step of coupling an antioxidant to each of a plurality of ~~monomers~~ molecules is carried out such that the resultant polymer has at least 10% of its monomeric units functionalized with antioxidants.

122. (Previously Presented) The method of claim 119, wherein the method further comprises coupling at least one antioxidant per monomer.

123. (Currently Amended) The method of claim 119, wherein the method further comprises selecting a ~~monomer~~ molecule from the group consisting of vinylbenzoic acid, amino acids, amino acid derivatives, carbohydrates, lactones, lactides, cyclic carbonates, esters, olefins, amides, urethanes, acrylides, vinyl monomers, vinyl ethers, acetals, aryl sulfones, ether sulfones, imides, etherketones, phenylene oxides, phenylene sulfides, carbonates, epoxides, phenolics, aminoplasts, sophorolactones, nucleosides, and dendrimers.

124. (Canceled)

125. (Currently Amended) The method of claim 119, wherein the step of coupling an antioxidant to each of a plurality of ~~monomers~~ molecules further comprises selectively acylating primary hydroxyl groups.

126. (Currently Amended) The method of claim 119, wherein the step of enzymatically coupling an antioxidant to each of a plurality of ~~monomers~~ molecules further comprises enzymatically coupling a primary hydroxyl group of the antioxidant to ~~the monomer~~ a molecule.

127. (Currently Amended) The method of claim 119, wherein the step of enzymatically coupling an antioxidant to each of a plurality of ~~monomers~~ molecules further comprises selecting an enzyme from the group consisting of proteases, glycosidases, and lipases.

128. (Previously Presented) The method of claim 119, wherein the method further comprises utilizing *Candida antarctica* lipase.

129. (Previously Presented) The method of claim 119, wherein the method further comprises selecting the antioxidant from the group consisting of ascorbic acids, vitamin E derivatives, tocopherols, α -tocopherols, β -tocopherols, γ -tocopherols, ϕ -tocopherols, ϵ -tocopherols, ξ 1-tocopherols, ξ 2-tocopherols, η -tocopherols, vitamin B derivatives, thiamines, cyanocobalamins, ergocalciferols, cholecalciferols, vitamin K derivatives, phytonadiones, menaquinones, quercetins, vitamin A derivatives, retinols, retinals, 3,4-didehydroretinols, α -carotenes, β -carotenes, δ -carotenes, γ -carotenes, cryptoxanthins, citric acid, butylated hydroxyanisoles, butylated hydroxytoluenes, alpha-lipoic acids, glutathiones, carotenoids, allylic sulfides, selegilines, N-actylcysteines, lecithins, tartaric acids, caffeic acids, diaryl amines, thioethers, quinones, tannins, xanthenes, procyanidins, porphyrins, phenolphthaleins, indophenol, coumarins, flavones, flavanones, and isomers, derivatives, and combinations thereof.

130. (Currently Amended) The method of claim 119, wherein the step of coupling an antioxidant to each of a plurality of ~~monomers~~ molecules further comprises coupling ascorbic acid to the ~~monomers~~ molecules.

131. (Previously Presented) The method of claim 119, wherein the method of enzymatically polymerizing the antioxidant-coupled monomers further comprises using horseradish peroxidase (HRP).

132. (Previously Presented) The method of claim 119, wherein the method further comprises casting the polymer into a shaped form.

133. (Previously Presented) The method of claim 132, wherein the form is selected from the group consisting of films, fibers, coatings, sheets, tubes and combinations thereof.

134. (Currently Amended) The method of claim 119, wherein the method further comprises selecting a ~~monomer~~ molecule that is biodegradable.

135. (Currently Amended/Withdrawn) The method of claim 119, wherein the method further comprises selecting biodegradable ~~monomers~~ molecules from the group consisting of polyesters, glycolides, lactides, trimethylene carbonates, caprolactones, dioxanone, hydroxybutyrates, hydroxyvalerates, carbonates, amino acids, "pseudo" amino acids, esteramides, anhydrides, orthoesters, sophorolactones, nucleosides, dendrimers, and combinations thereof.

136. (Currently Amended) The method of claim 119, wherein the method further comprises selecting a single type of ~~monomer~~ molecule and the step of polymerizing the antioxidant-coupled monomers into an antioxidant-coupled polymer further comprises forming an antioxidant-coupled homopolymer.

137. (Currently Amended/Withdrawn) The method of claim 119, wherein the method further comprises selecting a plurality of different ~~monomers~~ molecules and the step of polymerizing the antioxidant-coupled monomers into an antioxidant-coupled polymer further comprises forming an antioxidant-coupled copolymer.

138. (Currently Amended/Withdrawn) A method of protecting an oxygen sensitive material from degradation comprising:

~~coupling an antioxidant to each of a plurality of monomers;~~

enzymatically synthesizing ~~polymerizing the antioxidant-coupled monomers to form an~~
antioxidant-coupled functionalized polymer according to the method of claim 119; and,

surrounding the material within the antioxidant-coupled functionalized polymer,

whereby the antioxidant-coupled functionalized polymer scavenges free radicals so as to
protect material from oxygen degradation.

139. (Canceled)

140. (Withdrawn) The method of claim 138, wherein the method further comprises
selectively acylating a primary hydroxyl group of the antioxidant.

141. (Withdrawn) The method of claim 138, wherein the method further comprises housing
oxygen sensitive material in direct contact with the shaped form.

142. (Withdrawn) The method of claim 138, wherein the method further comprises forming a
packaging for foodstuff, wherein the antioxidant coupled polymer is in direct contact with the
foodstuff.

143. (Withdrawn) The method of claim 138, wherein the method further comprises coating a
pharmaceutical agent with the antioxidant coupled polymer.

144. (Withdrawn) The method of claim 138, wherein the method further comprises applying
a second oxygen impermeable packaging material coating the antioxidant coupled polymer,
distal to the oxygen sensitive material.

145. (Currently Amended/Withdrawn) The method of claim 138, wherein the method
further comprises utilizing biodegradable molecules ~~monomers~~.

146. (Withdrawn) The method of claim 138, wherein the method further comprises
implanting the antioxidant-coupled polymer into a subject.

147-155. (Canceled)

156. (Currently Amended/Withdrawn) The method of claim 119, wherein the A-method of controlled delivery of an antioxidant to a subject comprising

coupling an antioxidant to each of a plurality of biodegradable monomers; and

enzymatically polymerizing the antioxidant-coupled biodegradable monomers;

whereby the resultant antioxidant-coupled functionalized polymer will degrade over time and deliver the antioxidant at a controlled rate to when implanted in a subject.

157. (Withdrawn) The method of claim 156, wherein the method further comprises coupling at least 70% of the resultant polymer's monomer units with antioxidants.

158. (Canceled)

159. (Currently Amended/Withdrawn) The method of claim 156 158, wherein the method further comprises selectively acylating a primary hydroxyl group of the antioxidant.

160. (Currently Amended/Withdrawn) The method of claim 156 158, wherein the step of enzymatically coupling an antioxidant to each of a plurality of ~~monomers~~ molecules further comprises utilizing a lipase.

161. (Withdrawn) The method of claim 156, wherein the step of polymerizing the antioxidant-coupled monomers further comprises using the enzyme horseradish peroxidase (HRP).

162. (Currently Amended/Withdrawn) The method of claim 156, wherein the method further comprises casting the antioxidant-coupled functionalized polymer into a shaped form selected from the group consisting of a film, a fiber, a coating, a sheet, and combinations thereof.

163. (Withdrawn) The method of claim 162, wherein the method further comprises housing oxygen sensitive material in direct contact with the shaped form.

164. (Currently Amended/Withdrawn) The method of claim 156, wherein the method further comprises coating a pharmaceutical agent with the antioxidant-coupled ~~biodegradable~~ functionalized polymer.

165. (Currently Amended/Withdrawn) The method of claim 156, wherein the method further comprises embedding a pharmaceutical agent within the antioxidant-coupled ~~biodegradable~~ functionalized polymer.

166-169. (Canceled)

170. (New) The method of claim 119, wherein the antioxidant-coupled monomers comprise at least one of a vinyl monomer, a phenolic monomer, a lactone, a lactide, and a cyclic carbonate.